Process Water Conservation
Food and Electronics

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PROCESS WATER CONSERVATION

- Minimize Water used by your Processes which goes down the drain.

- Typical Liquid Process - You use the water. When it gets contaminated - you discard it.

- Think of Cycles

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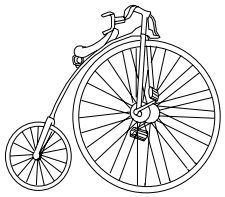
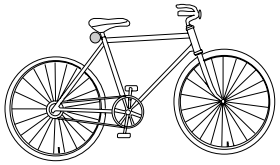
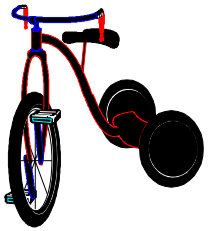
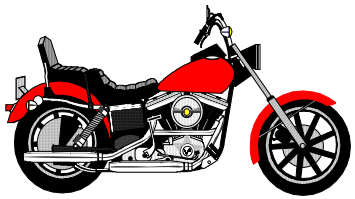
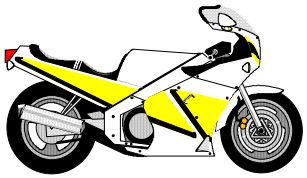
CYCLES











- <u>Cycles Up</u> - Contaminant Level Increases
- <u>Cycles Down</u> - Process Water Loses its Strength

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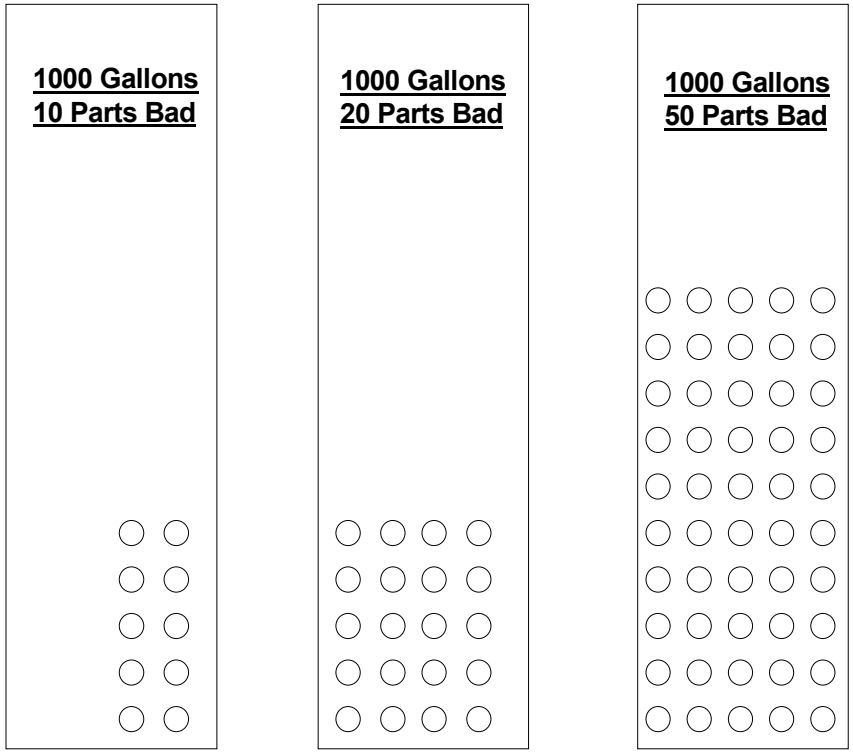
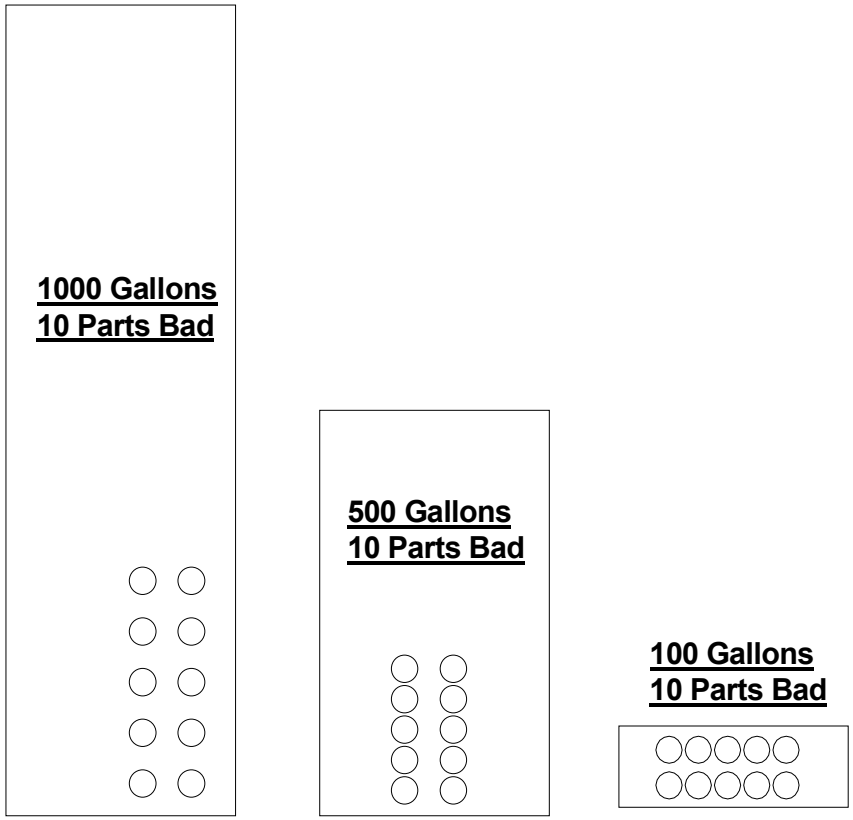
Build Up Cycles



- 1,000 Gallons & 10 Parts is 1%.
- 1,000 gallons & 20 Parts is 2 %.
- 1,000 gallons & 50 Parts is 5 %.
- Same Volume - Concentration Up

Evaporation Concentration Cycles

- 1000 Gallons & 10 Parts is 1%.
- 500 Gallons & 10 Parts is 2%.
- 100 Gallons & 10 Parts is 10%.
- Same Number - Concentration Up



Single Contaminant Removal

- ***Contaminant A - Which are Particulate Solids Kills the Process at 40 PPM Cycles Up at 10 Parts per Day***
- ***If we remove 10 Parts Per Day we will extend the Life of the Process - Yes. Indefinitely??***
- ***No - Because there is probably some other contaminant which will Cycle Up that we never saw before.***

Multiple Contaminants

- **A - Kills Process at 40 PPM**
  Cycles Up at 10 Parts per Day – 4 Days
- **B - Kills Process at 400 PPM**
  Cycles Up at 40 Parts per Day – 10 Days
- **C - Kills Process at 10 PPM**
  Cycles Up at 1 Part per Day – 10 Days
- **D - Kills Process at 120 PPM**
  Cycles Up at 20 Parts per Day – 6 days
- **Contaminant A kills the process first - 4 Days**

In Process Water Uses

- **Washing Process Waters - Detergents Cycles Down - Lose Strength**
- **Rinsing Processes - Cycles Up - Lose Solvent Strength**
- **Cooling Water - Cycles Up Something Eventually Precipitates**

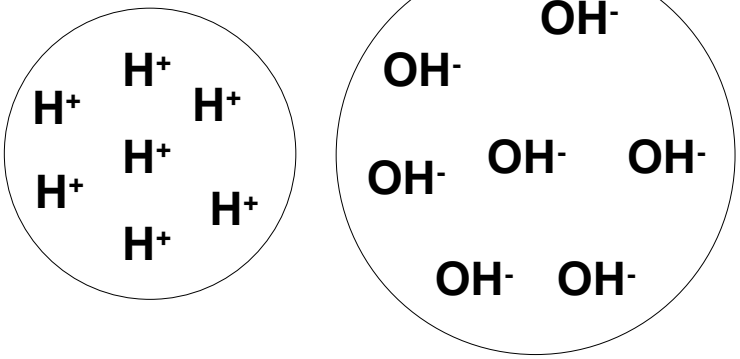
Types of Contamination

- Particles - Something you can see and sometimes feel.
- Dissolved - Minerals in water. In a wash bath you want the dissolved minerals. When you rinse the part in a rinse bath it's now a contaminant.
- Emulsified - Oil & Greases typically. Often part of your product. Once in water it's a contaminant.

Filtration - Cycle Down Particles

- Particle Removal
  - Sand Filters
  - Bag Filters
  - Cartridge Filters
  - Surface Screen
  - Simple Strainers

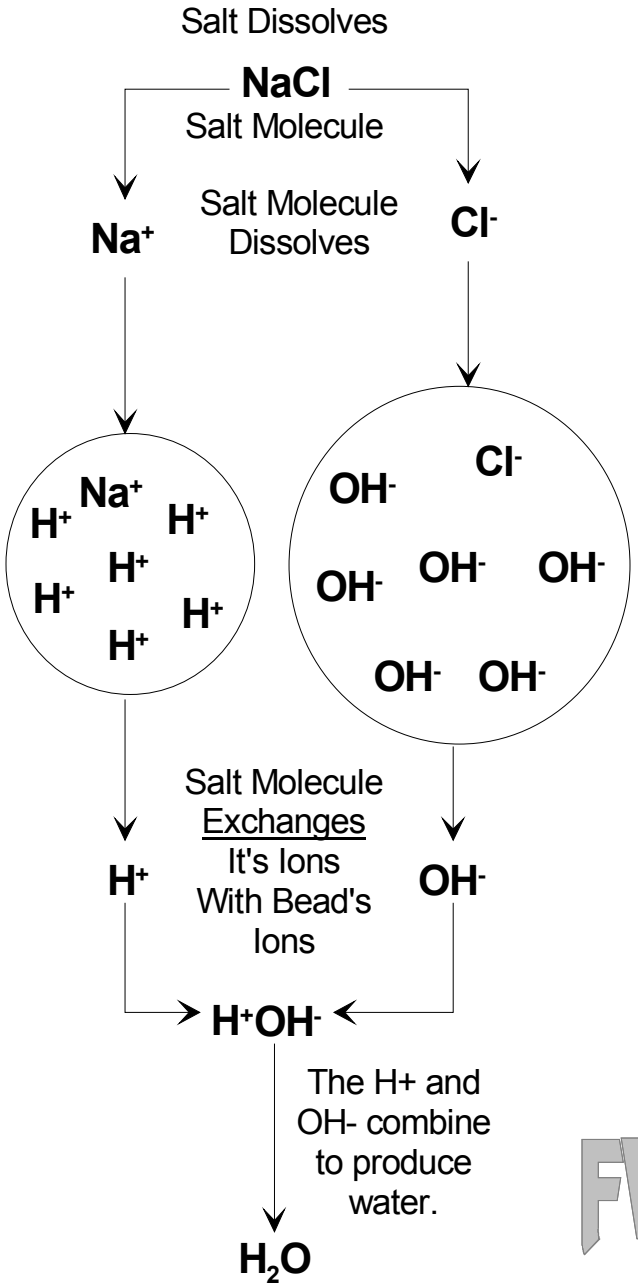
Ion Exchange



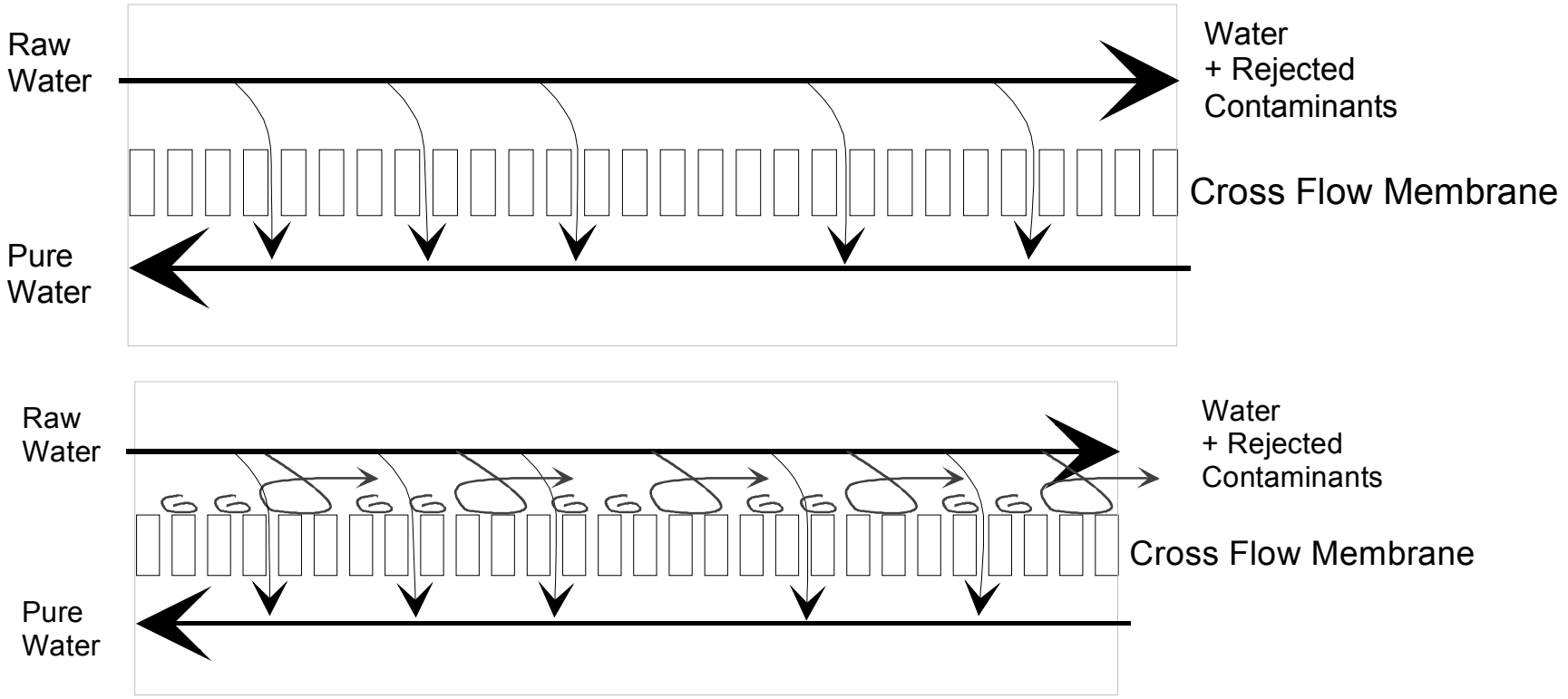
Cation Resin Positive

Anion Resin Negative

Ion Exchange Removes Dissolved Contaminants.

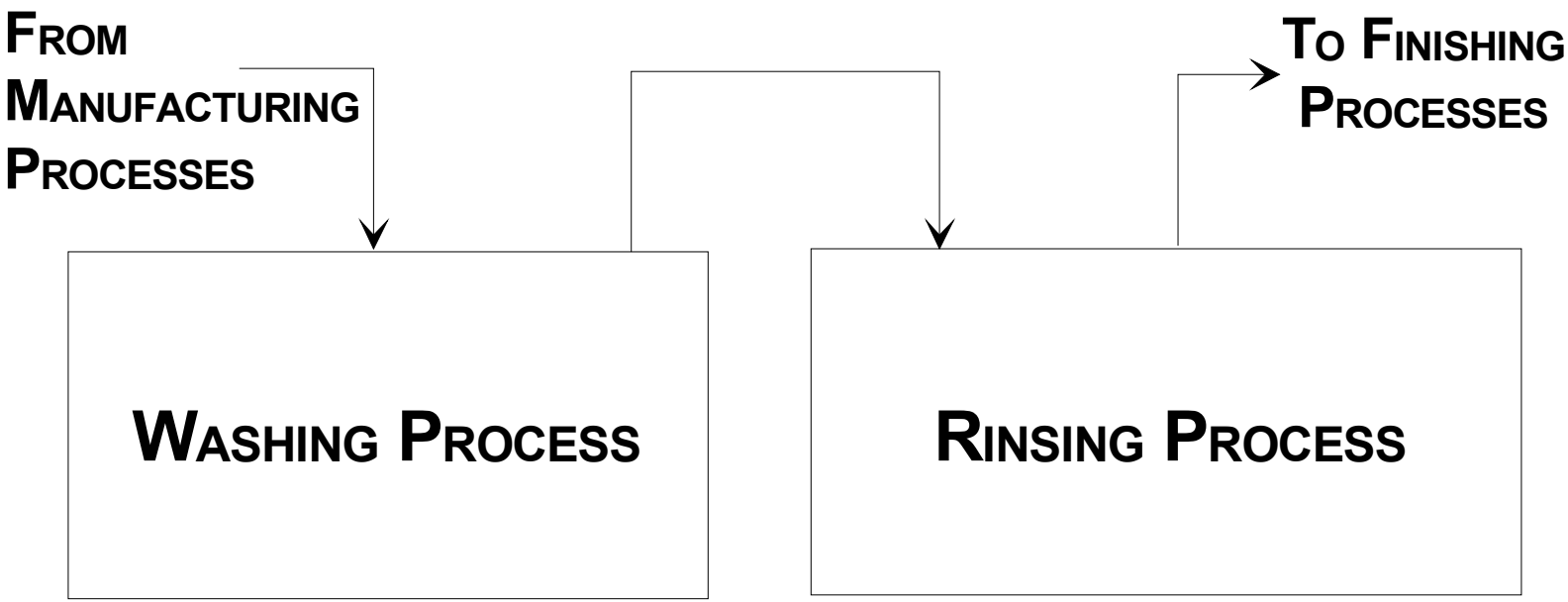


Cross Flow Processes – Cycle Down



Cross Flow Processes remove contaminants you can't see - dissolved, emulsified etc.

Typical Wash & Rinse Process



- Parts are Manufactured.
- Then Washed and Rinsed.

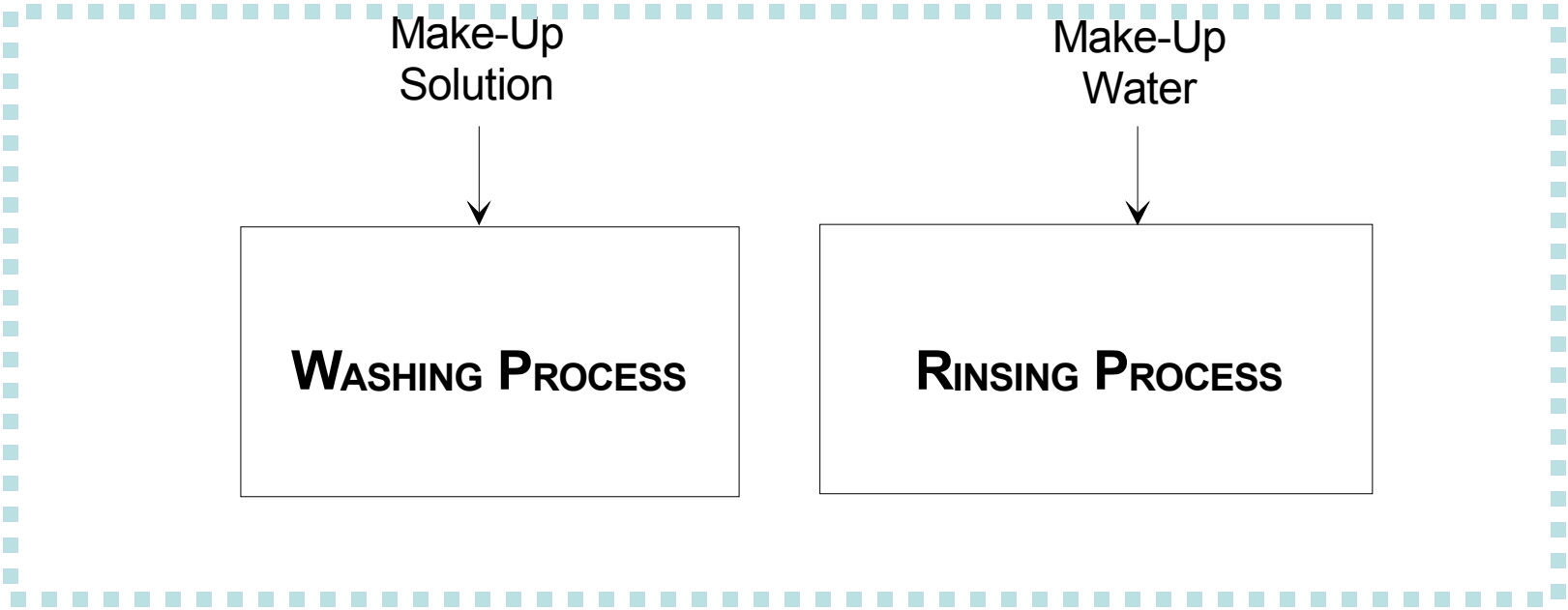
Washing & Rinsing Processes

- Electronics
  Acids & Etchants
  Washes & Rinses
- Food Processing
  Wash
  Rinse
  Sanitize
  Rinse

Rinsing Processes

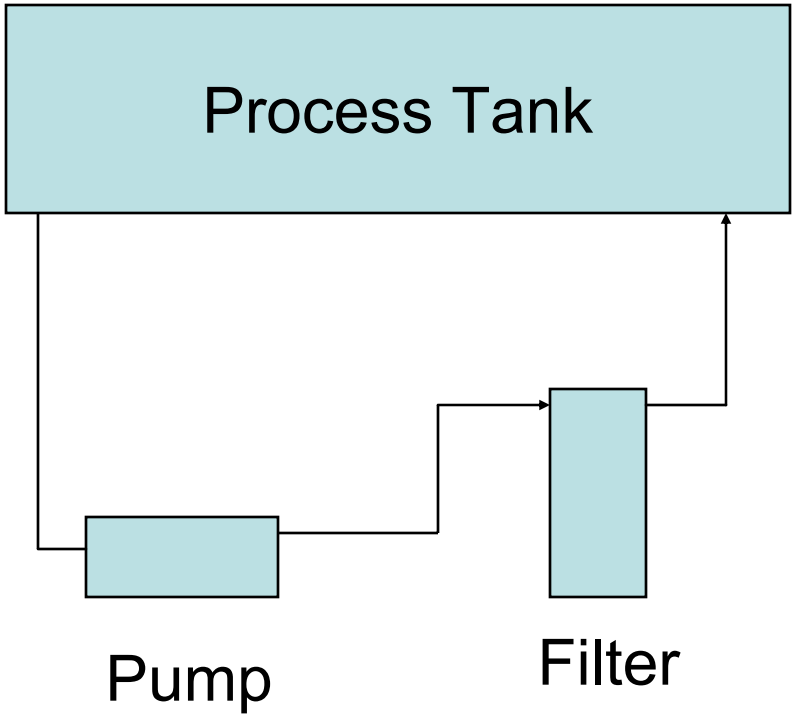
- **Dissolved Minerals Cycles Up - Lose Solvent or Rinsing Strength(Ability).**
- **Picks Up Dissolved Contamination Then it can no Longer be a "Solvent" or dissolve contaminants.**
- **Often A Heated Bath - <u>Evaporation Concentration</u> of Source Water Minerals**

Wash & Rinse Water



- Make Up Solution is Tap Water
- Make-Up Water is Tap or DI Water

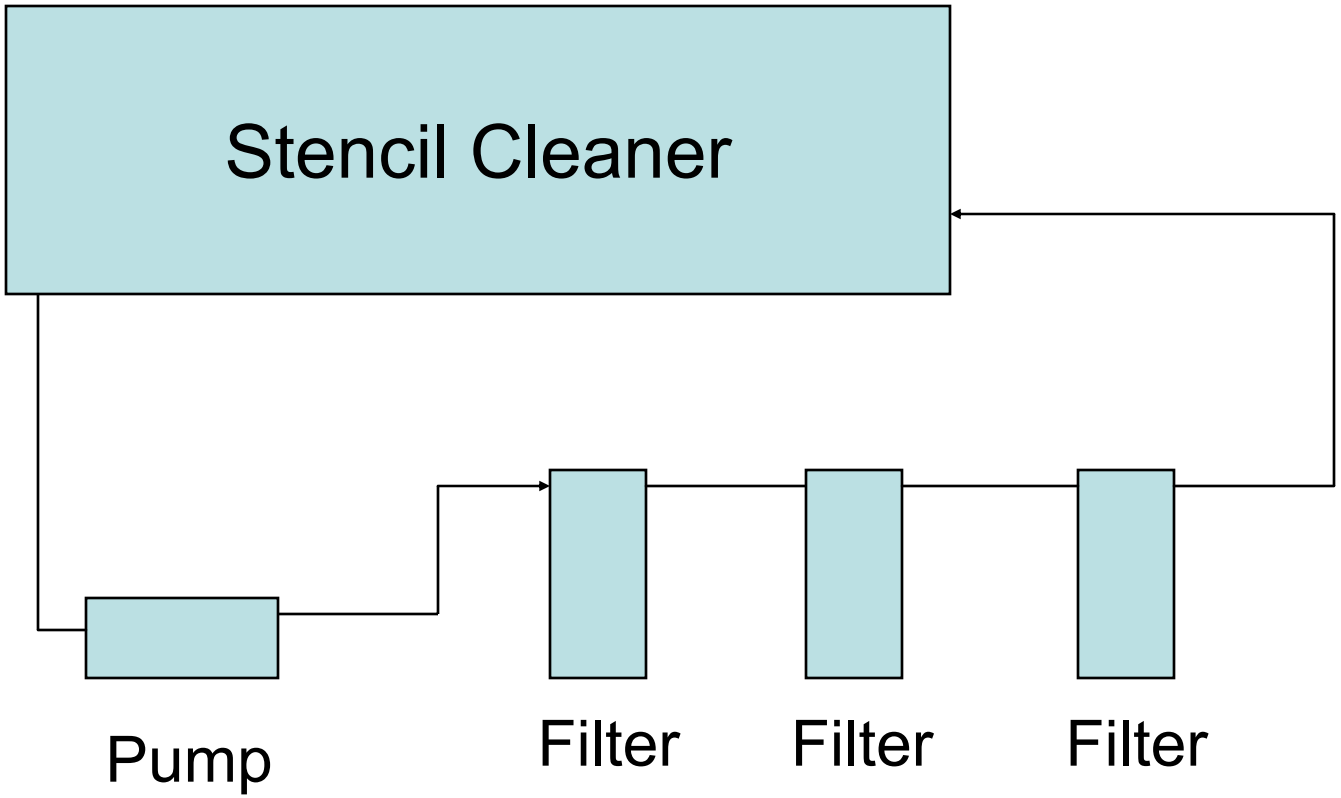
Process Tank Sidestream Filters



Electronics – Water Conservation

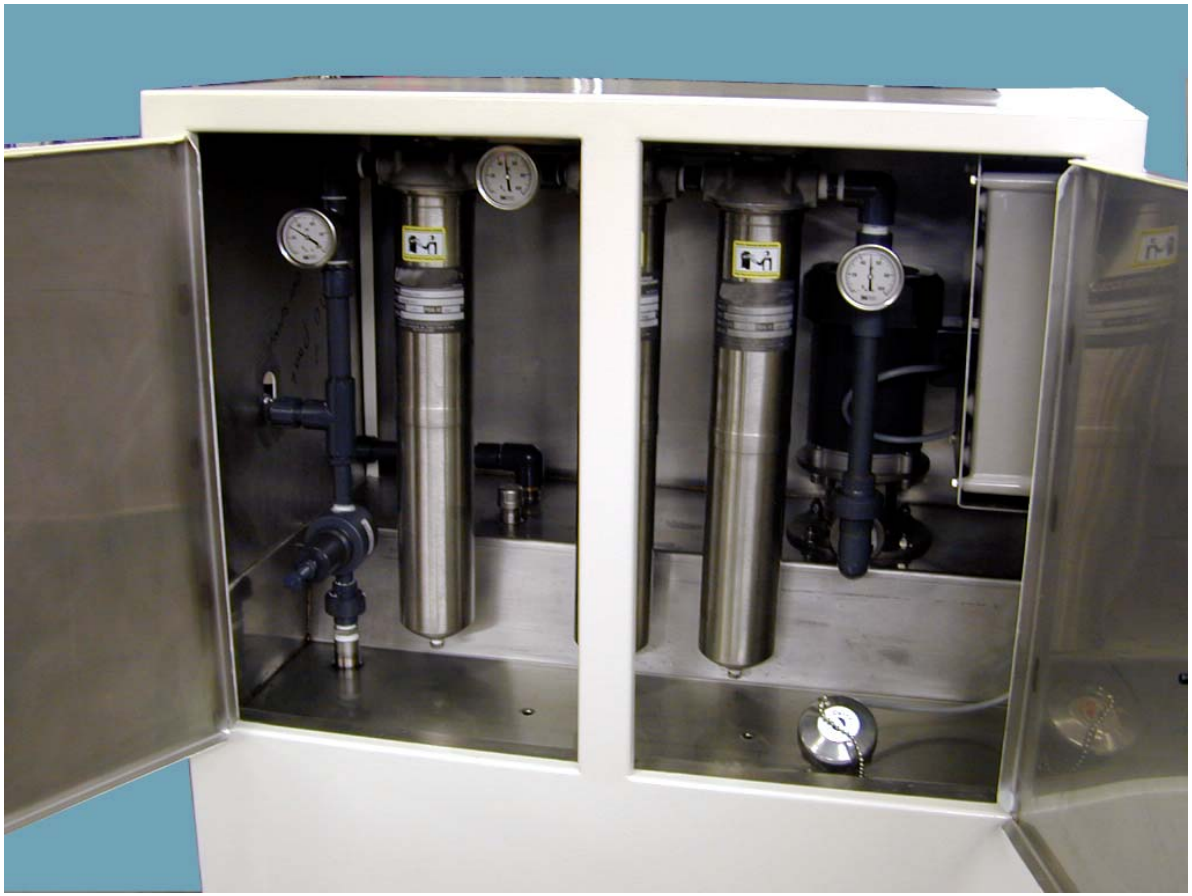
- Rinsing Processes
  Stencil Washing
  PCB Aqueous Cleaning

Stencil Cleaning Water Reuse

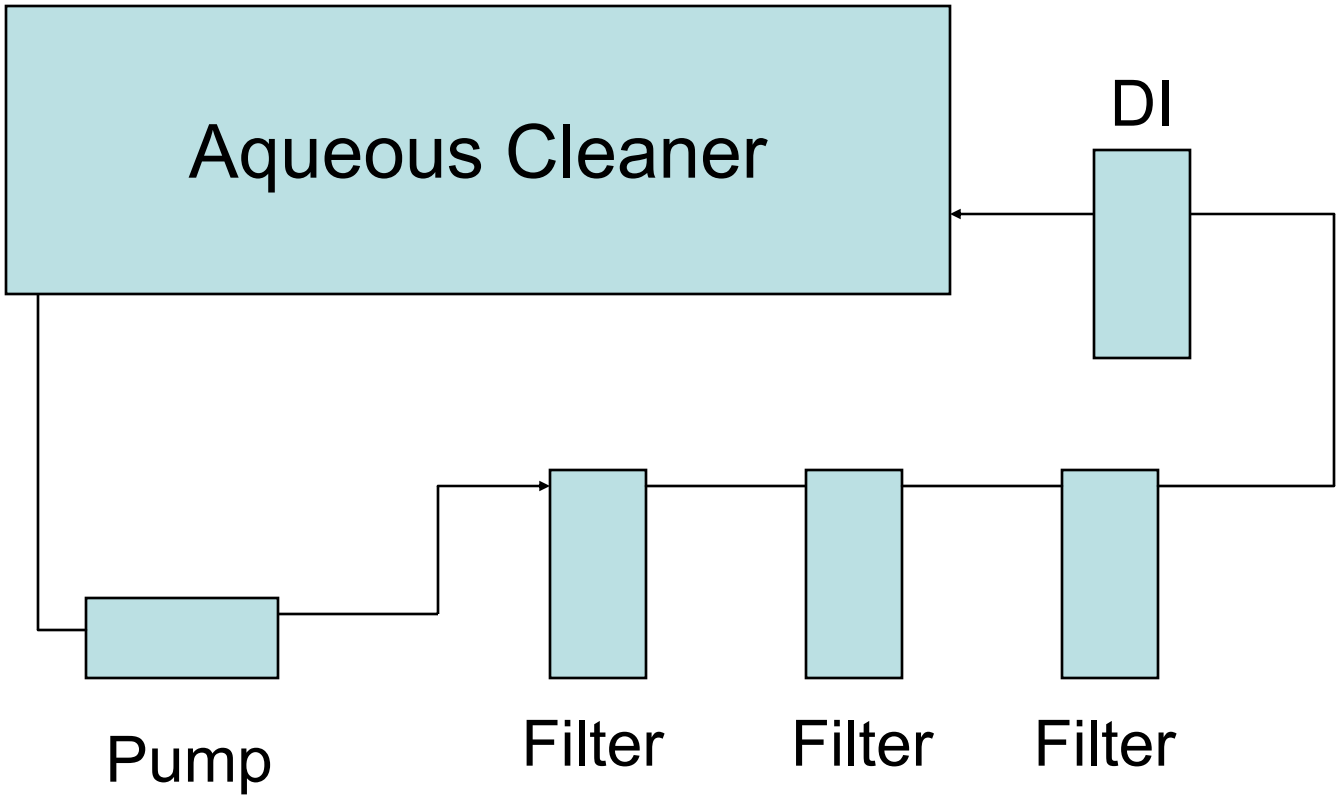


Ultrasonic Stencil Cleaner

Electronics - Stencil Cleaning Water Reuse



Electronics - Aqueous Cleaning Water Reuse



Cooling Water

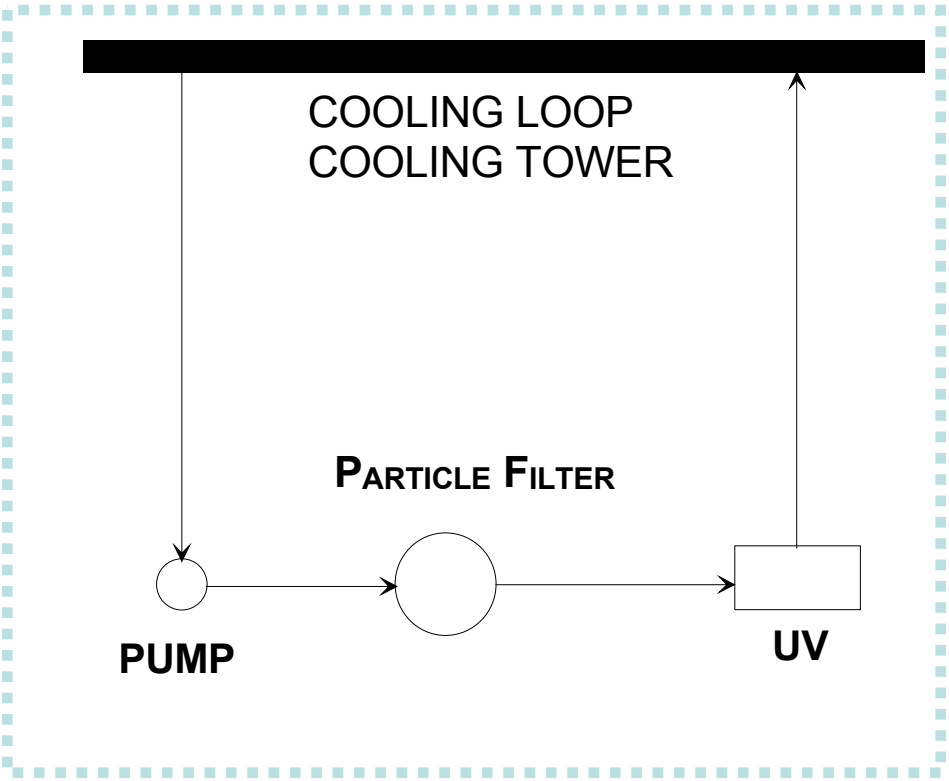
- **By far the Number 1 use of Industrial Water.**
- **Well over 90% of Industrial Water used is for Evaporative Cooling.**

Cooling Water

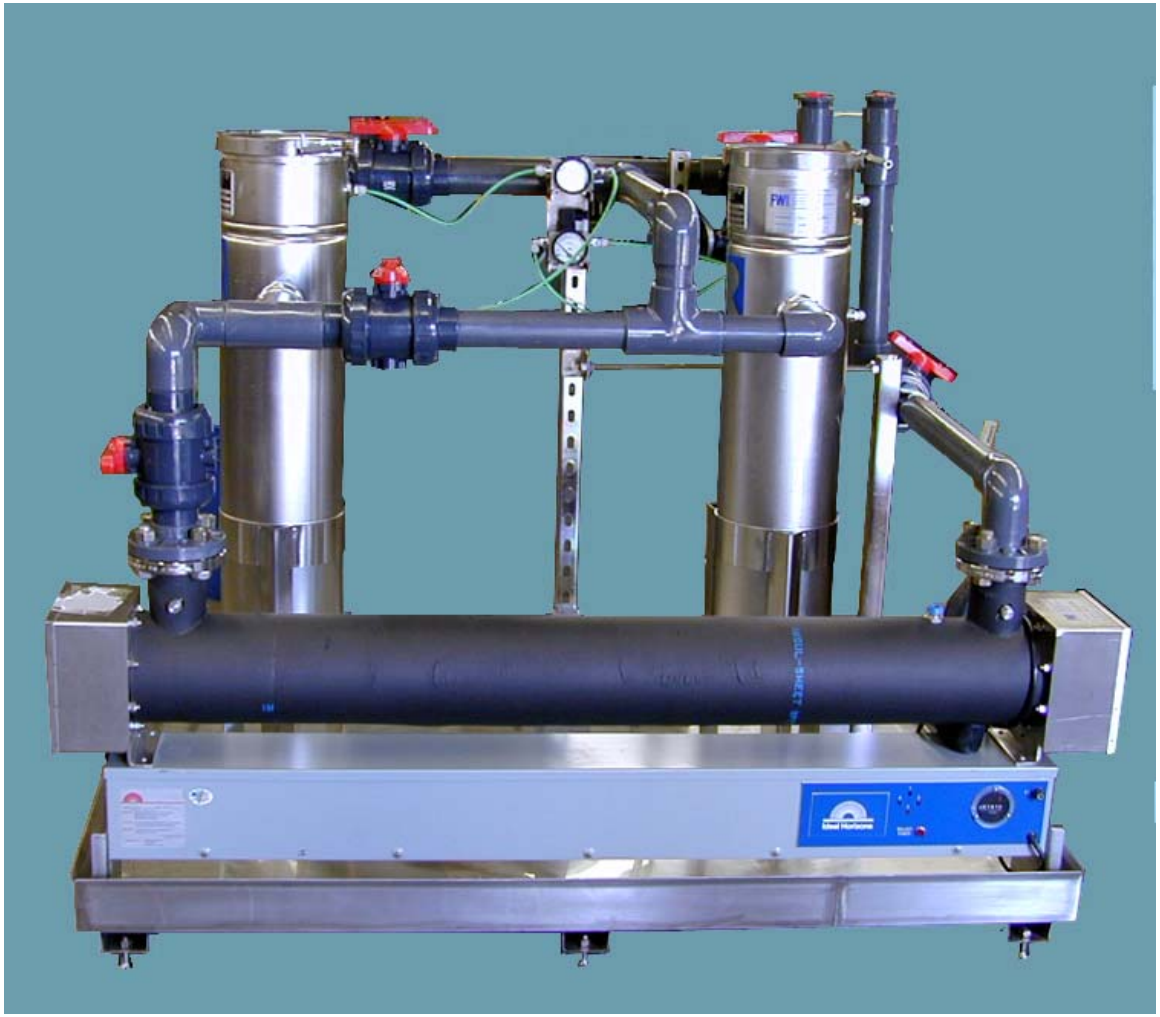
- **Cycles Up - Evaporation increases the concentration of everything.**
- **Water Scrubbing Action of Tower pulls in Particle Contamination from the Air. These particles also Cycle Up.**
- **Blowdown removes Contamination but also Consumes Water & Chemicals.**

Cooling Water Conservation - Filter & UV

- PARTICLE REMOVAL FILTERS
- ULTRAVIOLET FOR BACTERIAL CONTROL
- SAVE WATER
- SAVE CHEMICAL USAGE
- INCREASE CYCLES OF CONCENTRATION



Cooling Tower Filter & UV



Water Conservation – Food Processing

- Emphasis now away from Reuse
- Not Recycling Water
- Now looking at Less Water for the same process.

Water Conservation – Food Processing

- Simplest Tip we've seen.
- Do not use a hose as a broom.
- Use a broom to push waste food scraps into grates.
- Much less water used.

Water Conservation – Food Processing

- Minimize Water used for cleaning and sanitization.
- Ozone and Cold Water for Hard Surface Sanitization.
- Requires an Engineered Look at the Cleaning and Sanitization processes used in the facility.

Conventional vs. Whitewater

1. Clean Hot Water & High Pressure
2. Degreaser-Foam and Dwell Time
3. Hot Water Rinse
4. Chemical Sanitizer
5. Final Cold Rinse

1. Cold Ozonated Water High Pressure

Whitewater

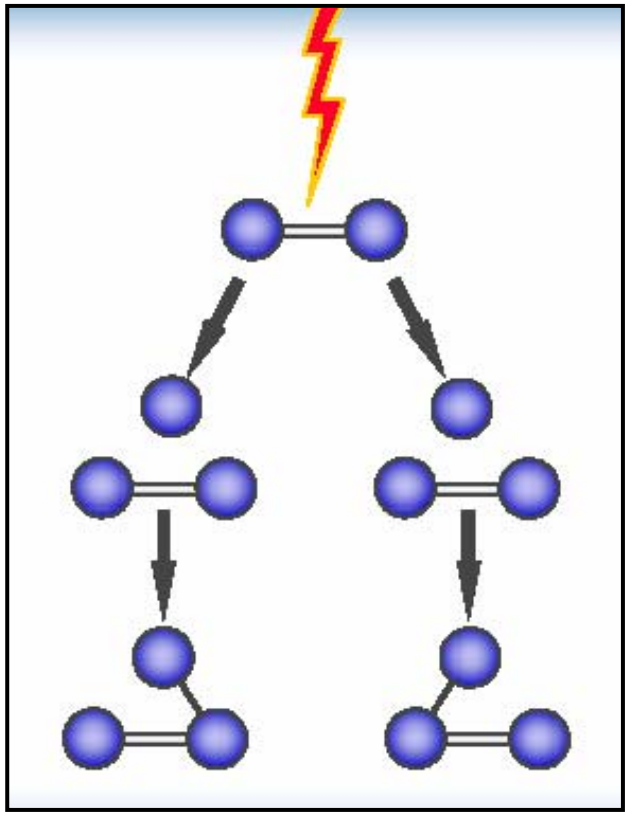
Patented Food Processing Industry solutions that provide ozone-enriched cold water for:

- **Surface Sanitation**
- **CIP/SIP**
- **Direct Food Contact**
- **Potable & Wastewater Treatment**

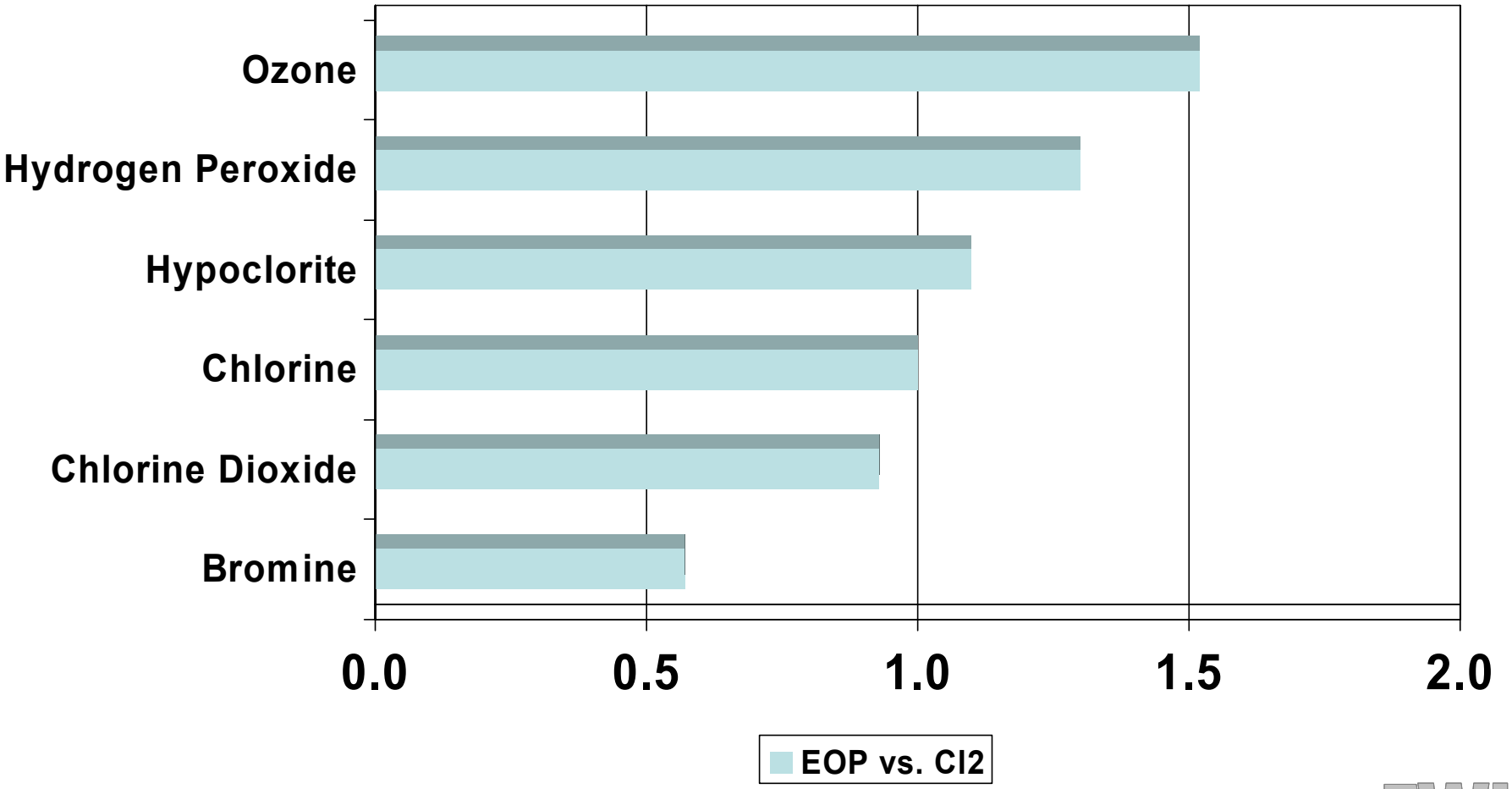
Whitewater Cleaning System has been characterized as a disruptive, breakthrough technology for food processors.

About Ozone

- Exceptional oxidizing power
- Superior anti-microbial properties
- 51% more powerful on bacterial cell walls than chlorine
- Kills bacteria 3100 times faster than chlorine
- Produces NO toxic by-products
- Has full FDA-approval for direct-food contact application



Relative Strength of Ozone



Whitewater Cleaning & Sanitation System

- Whitewater Cleaning System is a dual-stream cleaning system for mid and post-shift sanitation
- Simultaneously degrease and sanitize during production or production breaks
- Leaves no chemical residual after it curdles the bio-film and kills the bacteria

Whitewater Cleaning & Sanitation System

In a single application, a technician can simultaneously:

- CLEAN
  deliver high pressure cold water to quickly and effectively remove heavy solids (grease, dirt, waste)

- SANITIZE
  deliver cold, ozonated water to eliminate biofilm (E.coli, Salmonella, Listeria, viruses, mold, etc).

Whitewater: Benefits

- Clean & sanitize in a single application during production hours; extended production possible
- No toxic byproducts (“chemical free”)
- 100% elimination of hot water
- 100% elimination of sanitizers
- Up to 100% reduction in degreaser
- Up to 68% reduction in water volume

Whitewater: Benefits (Cont)

- Significant condensation reduction in plant
- Controlled cleaning (no over spraying)
- Reduces accidents related to chemicals
- Reduce time compression for post-shift sanitation
- Is not corrosive to stainless steel, plastics or concrete (including drains)
- Requires NO-RINSE

Conventional vs. Whitewater

1. Clean Hot Water & High Pressure
2. Degreaser-Foam and Dwell Time
3. Hot Water Rinse
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1. Cold Water High Pressure

Whitewater Applications

- Mid-Shift Cleaning & Sanitation
  1. ***Conveyor belts***
  2. ***Drains***
  3. ***Knives***
  4. ***Saws***
  5. ***Carcass catchers***
- CIP spray bars for degreasing belts during production leaving no residual on the product
- Buckets and Tubs
- Tote Racks
- Processing Tanks & Storage Vessels

Whitewater Applications by Industry

- Fish Processing
- Meat Plants
- Dairies
- Produce
- Etc.

Whitewater Summary

- Replace Hot Water & Sanitizer Steps
- Use Cold Water “Whitewater” patented technology
- Saves water, energy and time.
- Studies show up to 68% water saving.